

## WHAT IS CLAIMED IS:

- 1                   1.     A crossbar for providing connections between a plurality  
2 of ports and a plurality of system agents via a processing system comprising:  
3                   a plurality of ports, each port capable of being an input port  
4 customized for receiving data from a source agent and an output port  
5 customized for transferring data to a destination agent; and,  
6                   crossbar control data for specifying crossbar control information  
7 for transferring data from an input port to an output port having different port  
8 configurations.
- 1                   2.     The crossbar according to claim 1 wherein the data  
2 received on the input port further comprises control data for indicating validity  
3 and destination information relating to data received on the input port.
- 1                   3.     The crossbar according to claim 1 further comprising at  
2 least one register on each input port and each said output port for storing data  
3 in memory.
- 1                   4.     The crossbar according to claim 1 further comprising at  
2 least one shift register on each input port for storing data in memory and  
3 shifting data with larger bit length to a smaller bit length data for transmission  
4 from an input port with more width to an output port with less width.
- 1                   5.     The crossbar according to claim 1 further comprising at  
2 least one multiplexor device on each said input port and each said output port  
3 for prioritizing transmissions of data.
- 1                   6.     The crossbar according to claim 1 wherein an input port  
2 and an output port of at least one of said plurality of ports are customized to  
3 have different widths.

1           7.     The crossbar according to claim 1 wherein a plurality of  
2     said input ports are customized to have different width.

1           8.     The crossbar according to claim 1 wherein a plurality of  
2     said output ports are customized to have different width.

1           9.     The crossbar according to claim 1 wherein said crossbar  
2     control data contain control information for formatting bit length of data from  
3     an input port to be transmitted to an output port with less width than the input  
4     port.

1           10.    The crossbar according to claim 1 wherein said crossbar  
2     control data contain control information for use by any one from the group of a  
3     shift register or a multiplexor device.

1           11.    A crossbar having a plurality of paths for providing  
2     connections between a plurality of ports and a plurality of system agents via a  
3     processing system comprising:

4                a plurality of ports, each port capable of being an input port  
5     customized for receiving data from a source agent and an output port  
6     customized for transferring data to a destination agent;

7                a plurality of virtual communication channels on each input port;  
8     and,

9                crossbar control data for specifying crossbar control information  
10    for transferring data from a virtual communication channel to an output port  
11    having different configurations.

1           12.    A method for transmitting data between customized ports  
2     and a plurality of system agents in a processing system via a crossbar, wherein  
3     the crossbar includes a plurality of ports, each port capable of being an input  
4     port customized for receiving data from a source agent and an output port  
5     customized for transferring data to a destination agent, and crossbar control

6 data for specifying crossbar control information for transmitting data from an  
7 input port to an output port having different port configurations, the method  
8 comprising the steps of:

9 receiving data on an input port;  
10 obtaining the destination output port for the data received on the  
11 input port;  
12 determining whether the input port has the same configuration as  
13 the output port;  
14 obtaining control information from the crossbar control data  
15 when the input port does not have the same configurations as the output port;  
16 processing the data according to the obtained control information  
17 from the crossbar control data; and,  
18 transmitting the processed data to the destination output port.

1 13. The method according to claim 12 wherein said step of  
2 receiving data further comprises the steps of:

3 reading control data received with the data on the input port;  
4 determining whether the control data have valid port information;  
5 and,  
6 aborting when the control data does not have valid port  
7 information.

1 14. The method according to claim 13 wherein said step of  
2 obtaining the destination output port further comprises the step of obtaining the  
3 destination output port from the control data when the control data has valid  
4 port information.

1 15. The method according to claim 12 wherein said step of  
2 processing the data further comprising the steps of:

3 determining whether the width of the input port is more than the  
 4 width of the output port;  
 5 submitting the data as the processed data when the width of the  
 6 input port is not more than the width of the output port;  
 7 obtaining the width of the output port when the width of the input  
 8 port is greater than the width of the output port;  
 9 formatting the data from the input port to data configured for the  
 10 obtained width of the output port; and,  
 11 submitting the formatted data as the processed data.

1 16. A system for transmitting data between customized ports  
 2 and a plurality of system agents in a processing system via a crossbar, wherein  
 3 the crossbar includes a plurality of ports, each port capable of being an input  
 4 port customized for receiving data from a source agent and an output port  
 5 customized for transferring data to a destination agent, and crossbar control  
 6 data for indicating crossbar control information for transmitting data from an  
 7 input port to an output port having different port configurations, comprising:  
 8 a storage medium;  
 9 a machine for transmitting data between customized ports and a  
 10 plurality of system agents in a processing system via a crossbar, the machine  
 11 comprising a set of instructions for:  
 12 receiving data on an input port;  
 13 obtaining the destination output port for the data received on the  
 14 input port;  
 15 determining whether the input port has the same configuration as  
 16 the output port;  
 17 obtaining control information from the crossbar control data  
 18 when the input port does not have the same configurations as the output port;

19 processing the data according to the obtained control information  
 20 from the crossbar control data; and,  
 21 transmitting the processed data to the destination output port.  
 1 17. A machine for transmitting data between customized ports  
 2 and a plurality of system agents in a processing system via a crossbar, the  
 3 machine comprising a set of instructions to:  
 4 receive data on an input port;  
 5 obtain the destination output port for the data received on the  
 6 input port;  
 7 determine whether the input port has the same configuration as  
 8 the output port;  
 9 obtain control information from the crossbar control data when  
 10 the input port does not have the same configurations as the output port;  
 11 process the data according to the obtained control information  
 12 from the crossbar control data; and,  
 13 transmit the processed data to the destination output port.